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Oil production likely causing Eagle Ford earthquakes

By Jennifer Hiller, San Antonio Express-News Updated 12:31 pm, Tuesday, August 27, 2013

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An Eagle Ford rig, with additional drilling pads and a water pit, are visible near Kenedy (Photo by William Luther/Express-News)

Earthquakes in the Eagle Ford Shale region — including a 2011 quake felt in San Antonio — are likely being triggered by increased oil extraction, according to a new research paper from the University of Texas at Austin.

A two-year survey of seismic activity links small quakes in South Texas largely to the upswing in the production of oil and brackish water that flows up alongside hydrocarbons.

However, researchers concluded the quakes were not related to hydraulic fracturing, the process of pumping water, sand and chemicals at high pressure to crack open

dense shale. Nor do disposal wells, where companies discard hydraulic fracturing fluids and brackish water found underground, appear to trigger most of the quakes.

Previous studies have linked earthquakes to the disposal of fracking fluids in deep wells in other regions, including in other parts of Texas and in Ohio.

The UT study will be published online this week in the journal Earth and Planetary Science Letters.

More Information

Eagle Ford Fix: **Get your fix of the Eagle Ford Shale oil and gas play**

The most powerful quake included in the survey was an Oct. 20, 2011, event centered at Fashing in southeastern Atascosa County — a magnitude 4.8 earthquake that was felt throughout the San Antonio area, and as far south as Kingsville and as far north as Burnet.

No injuries or significant damage was reported, although in Atascosa County it rattled windows, cracked masonry and knocked items out of cupboards.

Cliff Frohlich, associate director and senior research scientist with UT's **Institute for Geophysics**, said the Fashing earthquake coincided with a significant increase in nearby oil and water extraction — something mirrored in previous quakes in Fashing in 1973 and 1984, other times when oil and gas production increased.

Most of the South Texas tremors have been too small to feel. And most of the quakes have been centered in Fashing, as well as in Karnes and Dimmit counties, two areas of heavy oil field activity.

“I have to have a nuanced takeaway,” Frohlich said. “I don't think people should be hugely concerned because of the huge amount of production and injection we've had in Texas. If it were a big problem, Texas would be famous for all its earthquakes.

“That said, some of the earthquakes like the 4.8 in Fashing are getting large enough to be of concern. If that had happened in an urban area there would have been severe damage.”

The study surveyed South-Central Texas and identified 62 probable earthquakes between November 2009 and September 2011, including 58 not reported by the U.S. Geological Survey. The earthquakes happened in 14 clusters — two near injection wells, eight near wells where increased volumes of oil or water were being extracted and four that were not near injection or extraction sites.

It found 22 quakes in Dimmit County, which had no previous reports of earthquakes. But the county did have a big upswing in both oil production and in the extraction of freshwater for use in fracking and agriculture, the study said.

Frohlich published research last year about seismic activity in the Barnett Shale in North Texas during the same time period. There, he concluded that the most reliably pinpointed earthquakes occurring during that time were in eight groups, all located within 2 miles of one or more injection, or disposal, wells.

One difference between the regions may be that South Texas has had production for decades, while the Barnett Shale development is more recent, or that there are more faults in the Eagle Ford than the Barnett that can be activated by fluid movement below ground, Frohlich said.

UT researchers tapped into a wealth of detailed seismic data not normally available. The **National Science Foundation**'s EarthScope USArray Program has funded a network of broadband seismometers across the country, and they happened to be in Texas for a roughly two-year period.

That program placed about 25 seismometers in or near the Eagle Ford Shale, althougl normally there are around eight in the entire state. Frohlich said the array has since been deployed on the East Coast.

The array moved out of South Texas two weeks before the Fashing quake, so researchers spent three days in the region interviewing residents instead.

Omar Garcia, president of the industry group South Texas Energy & Economic Roundtable, said the industry has had a minimal seismic impact on the region.

“We've experienced 70-plus years of production in South Texas with no significant seismic activity,” Garcia said. “To my knowledge, there's no evidence of dangerous earthquakes in the Eagle Ford Shale.”

jhiller@express-news.net

Twitter: @Jennifer_Hiller

Express-News and **Houston Chronicle** archives contributed to this report.